

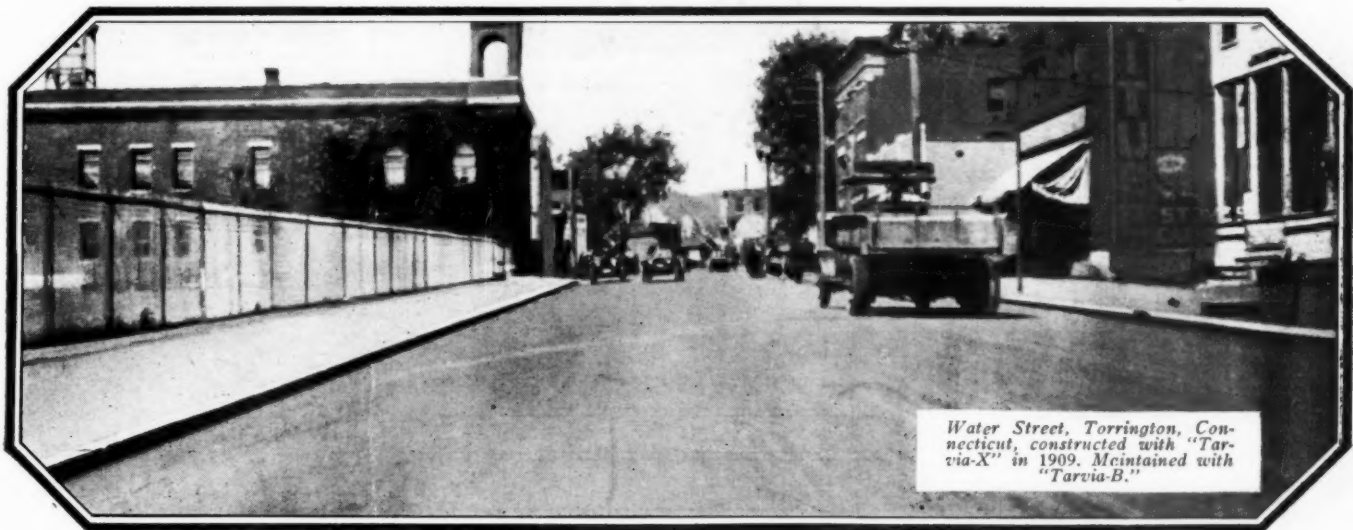
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A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

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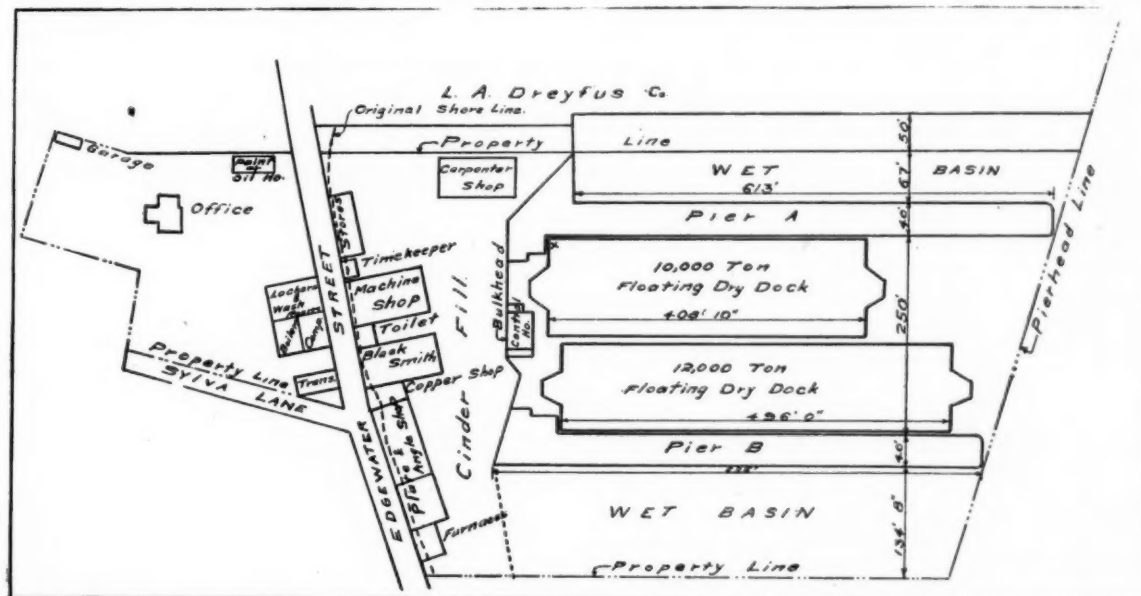
New York Harbor Dry Dock Corporation's Plant

Installation on the Narrows, New York bay, includes large floating docks, piers, wet basins, yards and shops with coordinated arrangement and equipment. Structural features, construction operations and plant. Ingenious methods of difficult submerged excavation and pile driving.

The construction of twelve new large municipal piers alternating with deep water slips for ocean steamships in the Narrows of New York bay on the east side of Staten Island, now in an advanced stage of completion, together with the rapidly increasing location of great warehouses, ship-building plants and other important enterprises on the adjacent shore of Richmond borough, New York City, demands corresponding facilities of a semi-public nature for the maintenance and repair of the great ships that ply to this port in increasing numbers, constituting an immense factor of the public welfare and commercial importance of the metropolis, and very directly influencing the construction, maintenance and opera-

tion of all kinds of public works and utilities in the city.

One of the most recent and important of these enterprises is the establishment at Clifton, Staten Island, adjacent to the north end of the municipal pier area, of the new plant of the New York Harbor Dry Dock Corporation, which has now been practically completed and is already in operation. It was constructed entirely by Fraser, Brace & Company, engineers and contractors, New York City, who commenced operations in July, 1919, delivered the first dry dock ready for service on October 11, 1920, and have now completed nearly all of the construction work which has been rapidly prosecuted notwithstanding the universal



GENERAL PLAN OF DRY DOCKS, PIERS, YARDS AND SHOPS

difficulties encountered in the labor and material fields and in transportation, which were by no means diminished by the simultaneous and adjacent construction of more than \$20,000,000 worth of very similar work for the municipal piers, which employed thousands of men and great quantities of material and equipment of exactly the same nature as were required for the dry docks enterprise.

The plant, with a waterfront of 600 feet on the pierhead line, occupies a trapezoidal area 600 feet wide and 1,000 feet long on the shore side of Edgewater street and has another irregularly shaped 300 x 400-foot area on the opposite side of the street where the offices, garage and some auxiliary buildings and storage space are located.

DRY DOCKS

The main features of the installation are the two floating dry docks of 10,000-ton and 12,000-ton capacity, which are, respectively, about 409 feet and 496 feet in length; two piers each 40 feet wide and about 600 feet and 700 feet in length; an independent 134 x 626-foot wet basin and a 67 x 640-foot extension forming part of an undivided wet basin 117 feet in width of which 50 feet lies beyond the property line separating this plant from an adjacent one. The piers extend from the corporation's new bulkhead to the pierhead line and on the shore side of the bulkhead there is a large level filled area providing space for storage, working yards, service tracks, pipe lines and conduits and for the various shops, mechanical installation, and power plant.

The floating docks are located side by side in a wet basin 250 feet wide with its level bottom dredged to a depth of 44 feet below mean low tide. They are each 117 feet wide, there is about 8 feet clearance between the docks themselves.

The docks are of similar design and are built of wood. The largest one, of 12,000 tons capacity, is 496 feet in length and the other, of 10,000 tons capacity, is 408 feet 10 inches long and 117 feet wide, with five pontoons 14 feet deep having side walls 31 feet high above the pontoon decks, 14 feet 8 inches wide at the base and 10 feet 7 inches wide at the top. They are moored to the piers by cast steel jaws bolted to the sides of the piers and engaging the flanges of steel channels mounted on the sides of the dry docks. This prevents the docks from moving horizontally, while leaving them free to move vertically through the full range required in using them.

PIERS AND BULKHEADS

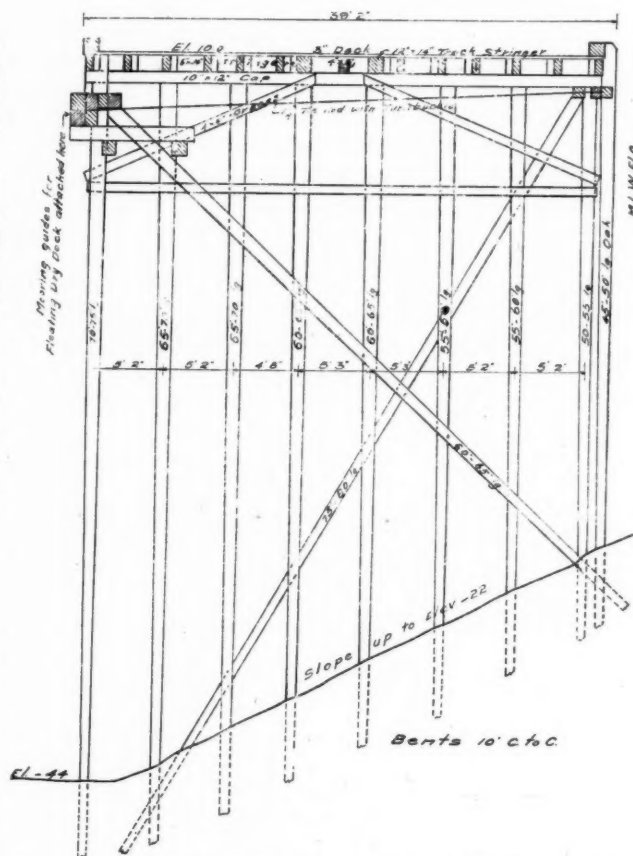
The piers have timber decks 10 feet above mean low water, supported on transverse pile bents 10 feet apart, each bent containing nine vertical piles and two inclined brace piles reaching across the full width of the bent and framed to the ends of the cap timbers. Diagonal transverse struts above low water form in connection with the spur piles, a system of transverse X-bracing for every bent. The piles were driven in water from 22 to 44 feet deep at mean low tide

and to an average penetration of about 18 feet.

There is about 600 linear feet of bulkhead on a crooked alignment made up of tangents from 25 to 250 feet long. It was built outside the original shore line and has a timber deck supported at an elevation about 2½ feet above low tide on transverse pile bents 5 feet apart longitudinally. The floor carries, along the bay side, a concrete bulkhead wall about 7½ feet high 6 feet thick at the base and 2½ feet thick at the top, which retains 7½ feet of cinder fill covering the remainder of the deck and extending with decreasing depth over most of the yard area beyond the original shore line. On the land side of the bulkhead the fill down to the original bottom of the bay below low tide elevation is retained by a line of 8-inch wooden sheet piling. Each of the foundation pile bents has seven vertical piles from 35 to 50 feet long and four spur piles driven at angles of approximately 30 degrees with the vertical, and framed at their upper ends to longitudinal ranger timbers moulded to the pile caps. The bulkhead piles were driven in water varying from 5 to 22 feet in depth.

PILE DRIVING

There were driven for the piers and bulkheads 3,900 piles of an average length of 53 feet, and to an average penetration of 18 feet. The best day's record was 30 piles driven by one crew. Most of the piles were driven after the dredging had been partially completed between the piers but before the bottoms of the slips had been en-



TYPICAL SECTION OF PIERS ADJACENT TO DRY DOCK BASIN

tirely leveled and trimmed thus permitting the work to be expedited by commencing the piers before the last 4 or 5 feet of dredging had been completed.

All of the vertical piles were driven by two floating machines, one equipped with a 40 h. p. Mundy boiler and engine and a 3,200-pound drop hammer, and the other equipped with a 30 h. p. boiler and engine and 3,000-pound hammer.

(To Be Continued)

Effect of Cleaning Boilers

A 100-horsepower return tubular boiler used for operating the municipal pumping plant of Chisholm, Minn., was found to be in bad condition by C. J. Sullivan, superintendent of the works, when he took charge of the plant some time ago, the boiler not having been cleaned since it was installed. The reason given for this neglect was that there was only one boiler and the filtered water supply which could be stored was not sufficient to warrant a shut-down long enough to permit cleaning the boiler.

Mr. Sullivan obtained permission from the electric light company to connect the village boiler to one of the boilers of that company's plant which was about 200 feet away. A 4-inch pipe line was run between the header of the water works boiler and that of the electric light company and the steam of the latter used for three days, while the municipal boiler was out of service. Before doing this, a 24-hour test run was made which showed 3 tons of coal consumed dur-

ing this period. After cleaning the boiler and making some changes to the open heater, two similar tests showed a coal consumption of slightly less than one ton for the 24-hour period. Based on the price of coal at that time, this effected a saving of over \$4,000 a year.

Break in Lancaster's Water Main

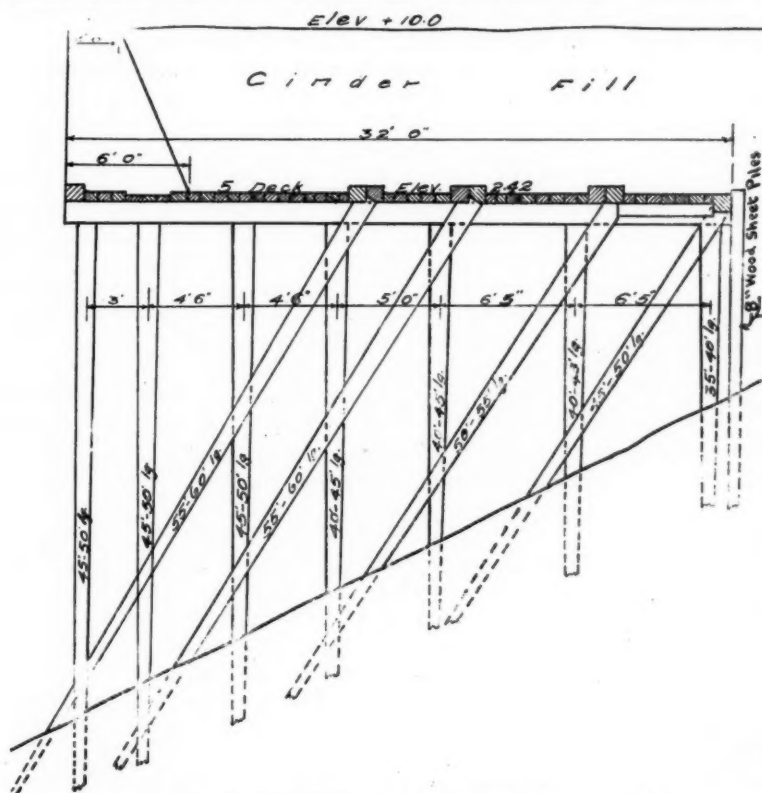
By John T. Brainard*

Six million gallons of water lost by bursting of thirty-inch main. Hydraulic valves closed by emergency air compressor.

On January 11, at 7:45 p. m., the recording gauge in the office of the Lancaster, Pa., water works dropped suddenly from 100 pounds pressure to 30 pounds. The entire plant is electrified and the pumps were immediately shut down and the engineer notified the superintendent, C. K. Will, and the chief engineer, John C. Coyle. Mr. Will at once had his men close the valves leading from the reservoir and standpipe. Before these could be closed, however, the reservoir had been drained down to 3 feet of water and the 400,000-gallon standpipe, which is 112 feet high and maintains pressure in the high-pressure system, was completely emptied. It was estimated that more than six million gallons of water escaped.

Two mains lead from the main pumping plant, one a high pressure, 30-inch main and the other a low pressure, 36-inch main. Ordinarily the 30-inch main is used to fill both the reservoir and the standpipe. It was found that this 30-inch main had broken, washing out the road in which it was laid and carrying a considerable amount of road material into a neighboring quarry. The superintendent and chief engineer happened to come along the road just at the time when a sudden gush of water washed out the road-bed from under their automobile, causing one side of the machine to drop into the trench and injuring Mr. Will.

A repair gang was put to work early the following morning. They found that the pipe, which had been laid about 20 years ago, had broken, apparently at a flaw, a section of the pipe 7½ feet long having been blown out. A section 8



SECTION THROUGH BULKHEAD PLATFORM AND WALL

*SECRETARY, Dept. of Water, Lancaster, Pa.



BREAK IN 30-INCH WATER MAIN



AUTO DITCHED IN WASHED-OUT TRENCH

feet long was cut out of the main, which is 1½ inches thick at this point, and by 9:30 in the evening of the same day a new piece had been inserted and water was turned on.

As soon as the leak had been located and the valves into this main been closed, pumping was resumed through the 36-inch main at the main pumping plant and a 10-million-gallon electric booster pump at the reservoir was put into service pumping water from the reservoir to the stand-pipe to give water to the high-service consumers. The booster pump was put into service at 3:30 a. m. A Bristol recording gauge is located in the office of the water department at the city hall. The usual pressure during the day is 54 to 60 pounds and somewhat lower at night. Owing to the service given by the unbroken 36-inch main, this pressure did not fall below 25 pounds, and by 4:10 in the morning after the break had risen to 55 pounds.

The valves at the pumping plant are all hydraulic, working under a water pressure of 75 pounds. As the pressure at the plant had fallen below 30 pounds they could not be operated hydraulically, but were closed by using an electric air compressor which had been installed for this purpose. This is the first time the air compressor has been used for operating the valves since the plant was electrified and it worked very satisfactorily.

Bids on New York Highways

Bids were asked on 20 roads in 16 counties of New York State by the State Highway Commission, to be received up to January 26, and on that date 83 bids had been received, or an average of about four to each contract. At the request of Governor Miller, Highway Commissioner Greene did not award the contract in view of the fact that the new commissioner, Herbert S. Sisson, would assume the duties of office six days later.

Installation for a \$700,000 Concrete Road Contract

Materials distributed over 10 miles of road from central storage in batch boxes hauled by locomotives on full-length 24-inch service track. Abundant equipment provided for distribution and construction operations.

Contracts 27-28 and C. N. 3 for the construction of about 10 miles of standard concrete highway were awarded by the Delaware State Highway Department in March, 1920, to the Keystone State Construction Co., Philadelphia, for the estimated price of about \$700,000. The work consisted of three roads radiating at approximately equal angles from Pine street corner 5.6 miles to Armstrong's corner, 2½ miles to Odessa, and 1¾ miles to Townsend. The entire job involved about 40,000 barrels of cement, 50,000 yards of broken trap rock imported from Pennsylvania and 25,000 yards of sand purchased from dealers and all delivered by rail to the storage yards at Townsend, where the contractor has established headquarters on a 150 x 1,500-foot yard adjacent to the Philadelphia, Baltimore & Wilmington Railroad tracks.

Along one edge of the lot there is a railroad siding 900 feet long that passes close to the 20 x 150-foot storage house of 4,000 barrels capacity, and has a switch connecting it with an adjacent dumping trestle 350 feet long and 8 feet high with a 2 per cent grade, from which all the sand and gravel is dumped in long piles from which it is reclaimed by a Browning steam locomotive crane running on a standard gauge track parallel to the siding and 25 feet distant from it. Another parallel track 50 feet from the siding with 24-inch gauge and 800 feet long runs through a timber-lined tunnel 8 feet wide, 7 feet high and 200 feet long, over which the sand and broken stone are piled by the locomotive crane. The service track extends beyond the ends of the tunnel, and at one end makes a loop passing tangent to the cement storage house and connecting with the main line that runs the full length of the three different sections of road included in the contract.

UNLOADING BULK CEMENT

Portland cement is received in bulk in carload quantities and is unloaded by hand, a process which was found by investigation to be quicker and more desirable than the use of any of several mechanical processes investigated, including the vacuum process, the installation of which would have involved a cost of \$8,000.

*Acknowledgment is made to the Atlas Portland Cement Co. through whose courtesy the accompanying illustrations are reprinted from "Contractor's Atlas."



LOADING TUNNEL BEFORE
SAND AND GRAVEL WERE
STORED OVER IT



WEATHER PROOF CEMENT
SHED



DELIVERING CEMENT TO
BATCH BOXES

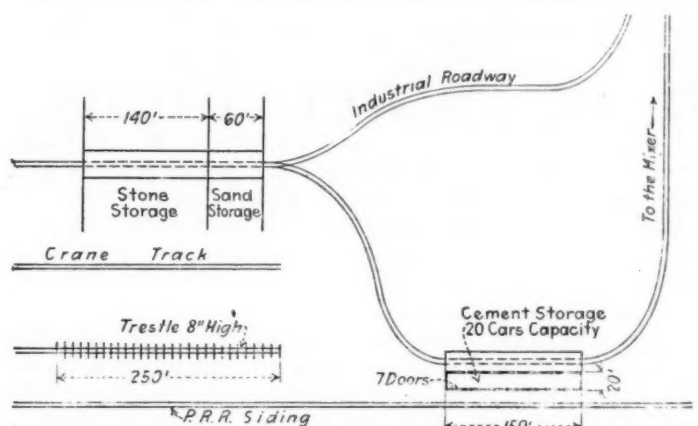
The cement storage house is very substantially built to exclude moisture and dampness. It has a concrete foundation and a concrete floor at ground level. The doors on the railroad side are so located that the cement can be discharged from the car directly into the house when shoveled by two men into the flared upper end of a wooden chute with cloth nailed over the top to confine the dust. When it becomes inconvenient to shovel into the chute it is removed and the remainder of the cement is unloaded by wheelbarrows.

MEASURING AND DELIVERING CEMENT

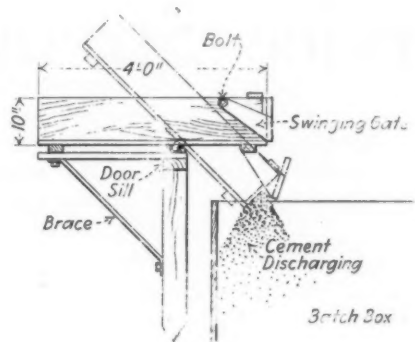
The doors of the cement house are spaced to match the batch boxes on a train of industrial

back and forth between the mixer and storage.

Each locomotive hauls alongside the cement house a train with two empty batch boxes on each car, where each box is filled with cement up to the gauge mark. The train is then hauled by a mule or pushed by hand and the cars spotted under twenty of the forty steel Lakewood gates in the roof of the tunnel, which are opened to fill the batch boxes up to the next gauge mark with sand, after which they are moved forward underneath the stone gates and the remaining space in each box is filled with stone. The loaded train is then hauled to the 5-bag mixer. The mixer was started at one end of the contract and moved



PLAN OF CENTRAL LOADING, UNLOADING AND STORAGE PLANT



TILTING CEMENT MEASURING BOX

cars. The door sills are 7 feet above track level and on each sill there are two tilting boxes, each holding 4 cubic feet of cement for one batch of concrete.

These boxes are easily filled by hand pails ready for the train of industrial cars. When it is spotted in position the boxes are tilted and discharge the cement through their automatic lift gates to the batch boxes.

MEASURING AND DELIVERING CONCRETE MATERIALS

There are provided 68 steel batch boxes and about half as many steel Koppel cars hauled in trains of 10 each by 3 Plymouth gasoline locomotives that are kept constantly busy running

rapidly forward at a rate which it is hoped will eventually provide for the completion of 20,000 linear feet of road per month when all operations are in full swing and the total maximum force of about 350 men have become well trained and expert in their respective duties.

CONCRETING AND FINISHING

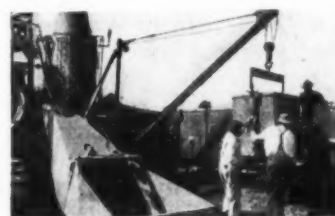
The concrete is placed between steel forms of the Blaw and of the Heltzel types, 1,000 linear feet of each of which have been installed for comparison. Sub-grade is rolled by a 10-ton Austin gasoline machine and by a 10-ton Buffalo steam roller and by two smaller rollers. The pavement is finished with a Lakewood finishing machine.



AGGREGATE STORAGE PILES
AND LOADING TUNNEL



TRAIN OF BATCH BOXES ON
SERVICE TRACK AT MIXER



DELIVERING BATCH BOX FROM
TRAIN TO MIXER

After a section has been completed it is protected by movable muslin screens, enough of which are provided for 1,000 linear feet of roadway.

The road is drained by long ditches with light grades, and the principal structures consist of five reinforced concrete arch bridges of 10 to 50 feet span with pile foundations, and one 10-foot and one 6-foot concrete culverts about 60 feet long. For their construction there is provided a Lakewood hoisting tower and chute with a small concrete mixer.

QUANTITIES AND EQUIPMENT

The execution of the three contracts involved about 150,000 yards of excavation, mostly steam shovel work, with cuts of a maximum depth of 15 feet. All of the excavated material is used for grading, besides which about 40,000 yards of sand are excavated for the same purpose from two borrow pits and hauled for a maximum distance of 1 mile in side-dump steel cars operated by the gasoline locomotives on a 24-inch service track.

Each of the borrow pits is drained by a gasoline pump delivering to an elevated wooden supply tank, from which the water is piped to all parts of the work through a 2-inch line. Another

gasoline pump connected to driven wells also delivers to the tank, but the main supply is from a 9 x 6 3/4 x 10-inch Worthington steam pump that forces the water 1 mile from a 15,000-gallon reservoir that the contractor made by the construction of a small earth dam 65 feet below the top of the storage reservoir.

The gravity system furnishes sufficient water for all parts of the work and is equipped with release and expansion valves that provide for its operation with the minimum of maintenance or attention.

At headquarters there are a smith shop, repair shop, machine shop, storage houses, offices and a stable 135 feet long for 36 horses and mules. The principal items of equipment include one No. 21 Marion steam shovel, one No. 31 Osgood steam shovel, one 120 h. p. Holt caterpillar tractor for hauling trees and stumps and transporting material in trailers, sometimes seven or more at once. There are a Jumbo grader, three motor trucks, two automobiles, three gasoline locomotives, 61 1/4-yard Koppel ideal-type side-dump steel cars, a considerable number of horse-drawn scrapers, plows, wagons and other tools, besides the special machinery previously mentioned.

Service Strength of Sewer Pipes

Relative effects that different methods and conditions of laying pipe have upon the strength of the sewer, as laid, to support exterior loads. Conclusions from tests made by the engineering experiment station of Iowa State College. Effect of sand bed and concrete cradle.

The subject of the strength of sewer pipe to resist pressure exerted upon it from above when laid in trenches and the amount of such pressure has been the subject of investigation for several years by the engineering experiment station of the Iowa State College. The conclusions from studies and tests made at this station were described at some length in "Municipal Journal" for October 15, 1914, and February 23, 1918. The latter article contained a series of tables giving the ordinary maximum loads on pipes in ditches from common back-filling materials for different widths and depths of trench and different kinds of material; also the ordinary supporting strength of sewer pipe, as determined by the standard test, in pounds per linear foot required for such conditions.

Recently the experiment station has published a further bulletin on the subject, entitled "Supporting Strength of Drain Tile and Sewer Pipe under Different Pipe-laying Conditions," in which is set forth the relative effect of pipe-laying condition upon the strength of the pipe, as laid, to support exterior loads.

The conclusions refer to pipe laid by the "ordinary" method as a basis of comparison. The ordinary method is "that in which the under side of the pipe is carefully bedded on soil for 60 to

90 degrees of the circumference, suitably rounding the bottom of the ditch for this purpose and digging hub holes for all pipe with hubs, and in which the pipe is surrounded with soil placed with ordinary care." Methods least effective in bringing out the strength of the pipe were termed impermissible methods, the bottom of the ditch not being suitably rounded to fit the under side of the pipe or hub holes not being properly dug, or re-filling material not being placed so as to fill all around the pipe, or other defects of a similar general character being permitted. Where these departures from the ordinary method occur the strength of the pipe was found to be only about 80 per cent of the ordinary strength. By employing "first-class" methods or using concrete cradles, the supporting strength may be increased. By "first-class" method is meant one "in which the under side of the pipe is very thoroughly imbedded in soil for at least 90 degrees of the circumference (suitably rounding the bottom of the ditch for this purpose and digging hub holes for pipe with hubs) and the entire pipe is surrounded with thoroughly compacted soil, all under the direction of a competent inspector constantly on the work."

In discussing the matter of the strength of a pipe after it has cracked, the author, W. J. Schlick,

points out that, with the pipe cracked into four quadrants (with cracks at top, bottom and each springing line), as is ordinarily the case, resistance to collapse of the sewer depends almost entirely upon the ability of the earth at the side cracks to withstand the horizontal thrust exerted by the two top quadrants. The aid which the earth furnishes to prevent the cracking of the pipe is indicated by the fact that measurements made on vitrified pipe 18 to 30 inches in diameter show that the lengths of horizontal diameters increased only from 0.027 inch to 0.0632 inch before the pipe cracked. "It is difficult to imagine a soil so firm that it would not be compressed the amount of this distortion on each side (from 0.0135 to 0.0316 inch) by a comparatively low pressure." However, where the pressure is distributed over a considerable area by concrete between the pipe and the side of the trench, considerable resistance to collapse of a cracked pipe may be furnished.

The report contains detailed descriptions of the manner of making the tests and the results, with photographs showing the manner of laying pipe, etc., the whole occupying 68 pages. The conclusions are summed up by the author in the following general statement:

Factors Aside from the Quality of the Pipe Affecting the Supporting Strength of Pipe in Ditches

"A. The supporting strength of the pipe in the ditch depends quite largely upon the area of the foundation to which the load on the pipe is transmitted and the uniformity of the distribution of the pressure over this area. A high supporting strength requires a wide and uniform distribution

of the pressure between the pipe and the bed upon which it rests.

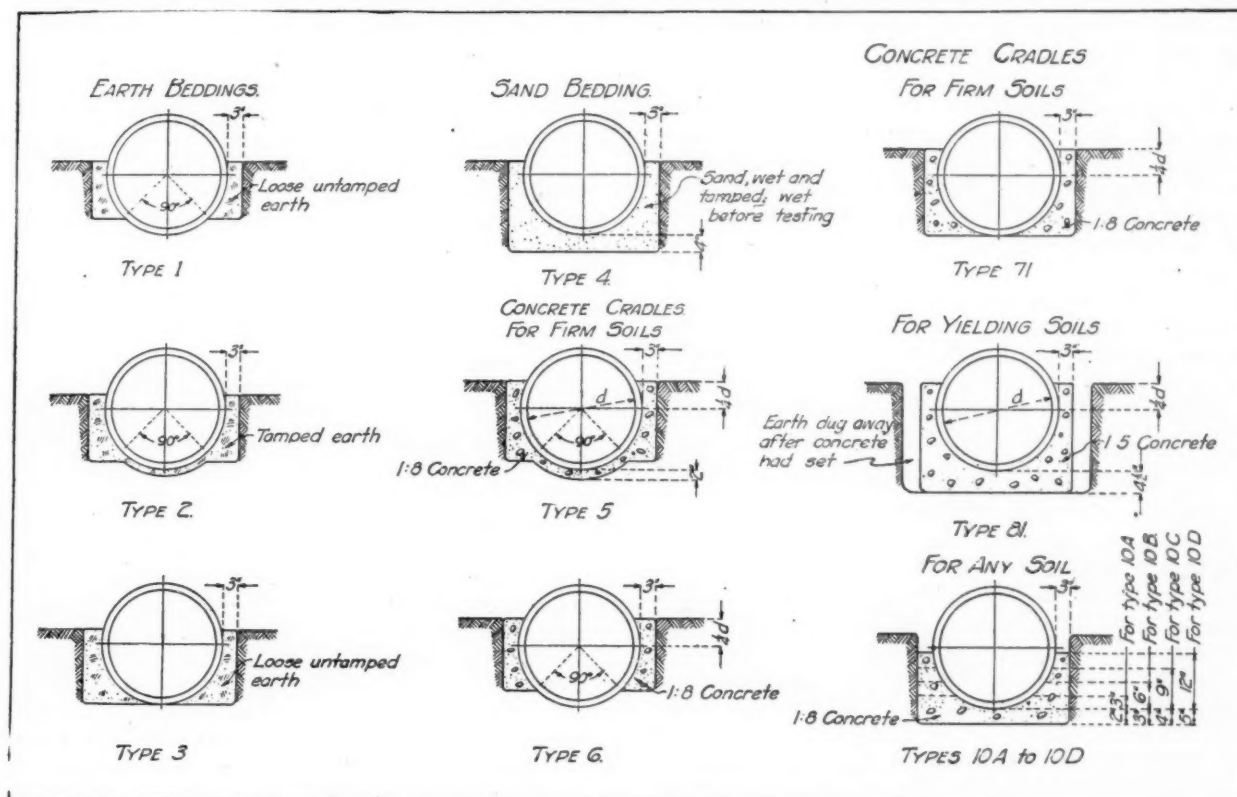
"B. The range in the supporting strengths of similar pipe in one of the general types of bedding, or methods of pipe laying, is small, comparatively. Variations in supporting strength will always exist because of variations in the pipe themselves, in the soil and in the methods of laying, so that it is impossible, at this time at least, to formulate rules that will obviate the necessity for the engineer to use his judgment in determining the probably average supporting strength which the pipe for a particular job will develop. Because of these facts it is both practicable and desirable, to group pipe-laying methods into classes or general types, as has been done in this investigation. The percentage of increase in supporting strength (before cracking) due to the use of concrete-cradle pipe-laying methods will depend upon the quality of the pipe themselves, the form and dimensions of the cradle and the quality of the concrete used in forming it.

"From the data at hand it seems rational.

1. To group pipe-laying methods in earth into three classes "ordinary," "first class," and "impermissible."

2. To class pipe-laying methods in sand and gravel, similar to those included in these investigations, as "first class," but to restrict their use to cases where hub-and-spigot sewer pipe are being used and the joints filled or calked.

3. To group concrete-cradle pipe-laying methods into four classes: "Combined earth and concrete-cradle," "concrete-cradle methods for any



DIAGRAMS SHOWING METHODS OF PIPE LAYING INVESTIGATED IN 1215

soil," "concrete-cradle methods for firm soils," and "concrete-cradle methods for yielding soils."

"In considering this grouping in connection with the data given herein, and in applying these data to his problems the engineer must not lose sight of the fact that some types of concrete cradles may be used in either firm or yielding soils, that some types of cradles are particularly adapted to use in a particular kind of soil and that the increase in supporting strength due to the use of a particular type of concrete cradle will depend, to some extent, upon the character of the soil in which it is to be used.

"C. The side support (resistance to horizontal thrust) obtainable in most soils is of little value in increasing the supporting strength (before cracking) of the pipe. When pipe are incased in concrete the pipe and the concrete act as a unit in resisting the deformation due to the load upon the pipe, thus increasing the supporting strength of the pipe.

"D. The supporting strength of a cracked pipe depends upon the bearing power of the soil at the sides, irrespective of the method of pipe laying, and upon the length of the time of continuous application of the maximum load. The presence of concrete at the sides of the pipe provides for a wider distribution of the side pressure, which, in some soils, results in a high supporting strength for a cracked pipe.

"E. The 'ordinary supporting strength' (i. e., the supporting strength of drain tile and sewer pipe with the 'ordinary' pipe-laying method or in the laboratory test with sand bearings) is the rational basis from which to calculate the supporting strength of the same or similar pipe under any other pipe-laying condition.

"F. The safe supporting strength (using a factor of safety) of drain tile or sewer pipe is the supporting strength before cracking. The supporting strength after cracking depends upon the bearing power of the soil, which may change due to any of several conditions, each of which is probable in different cases.

"G. A factor of safety of $1\frac{1}{2}$ is both necessary and sufficient to prevent cracking. This means that to insure safety against cracking the average supporting strength of the pipe to be used, with the method of pipe laying chosen, should be $1\frac{1}{2}$ times the probably maximum load upon the pipe.

Regarding Particular Pipe-Laying Methods

"H. The supporting strength developed by drain tile and sewer pipe with the 'ordinary' method of pipe laying is equal, with close approximation, to the average 'ordinary supporting strength' of the same or truly similar pipe, as determined by the standard test using sand bearings.

"I. The 'first class' method of pipe-laying increases the supporting strength of the pipe from 20 to 25 per cent.

"J. The supporting strength developed by pipe with the 'impermissible' pipe laying methods is only about 80 per cent of the 'ordinary supporting strength' of the same or truly similar pipe.

"K. The supporting strength developed by pipe bedded upon and surrounded by sand is approximately equal to that developed by the same or truly similar pipe with 'first class' pipe laying. Drain tile should never be placed in beddings of this kind.

"L. The supporting strength of drain tile and sewer pipe can be increased from 50 to 100 per cent by the use of properly designed concrete cradles, the amount of the increase in a particular case depending upon the character of the soil, the dimensions and shape of the concrete cradle, the quality of the concrete and the comparative strength of the pipe used."

Protecting Metal Flumes

The Department of Public Works of Nebraska has oversight over the irrigation systems of the state, which include several metal flumes. These flumes are more or less affected by rust and one of them was found in the spring of 1918 to be in a very bad condition, the rust having penetrated the steel so that the bottom of the flume was full of small holes varying in size from a pin-hole to about $\frac{1}{8}$ inch diameter. As an attempt at a temporary remedy, one coat of coal tar was applied to the inside of the flume. This seemed to seal up all the holes, and no further trouble from leakage had been noticed since then. (The report was dated November, 1920.) Previously experience had been had in painting flumes with water gas and coal tar in 1916 and 1917 and these also seemed to be about as good last November as when first put on three or four years earlier. "Prior to that time the experience had with a variety of paints tried on metal flumes was that the paint would peel off during its first water season. It therefore appears that water gas and coal tar is a very good paint for metal flumes and it is also a cheap paint."

Street Work in Chicago

Chicago ordinarily builds more than 160 miles of alley and street pavement a year, but last year built only 55.1 miles because of the high cost of material. It is expected to build about 150 miles of streets and alleys in 1921 which may cost \$8,000,000 or more, although the cost is considered indefinite under present market conditions.

Indiana Concrete Road Specifications

The Indiana State Highway Department has changed somewhat its specifications for concrete roads this year. The old specifications require 1.91 barrels of cement per cubic yard, while the new ones require only 1.7 barrels. The chief engineer of the department, C. Gray, is quoted as saying that the mixture under the old specifications was so rich as to cause an unnecessary amount of cracking and that the decision to decrease the amount followed a conference with James T. Voshell, district engineer for the Federal Bureau of Public Roads. He said that more or less cracking has appeared in the 45 miles of concrete road completed under the old specifications.

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Strength of Sewers

It is not often that a modern sewer collapses, although occasionally an old stone one does so, or the invert may wear out in a storm sewer, or it may be blown up by gasoline or other accident happen to it. But failure from outside pressure is rare, except where it is near the surface and a heavy truck or other load is placed on the surface over it.

If it were perfectly cylindrical and buried in a fluid it would be almost impossible to crush it; and as the conditions approximate this does the danger of collapse lessen. A circular sewer in dry sand or in muck is probably the nearest approximation to it. Whatever the soil, once it has settled into place entirely around the sewer, very little pressure is exerted upon the latter. (This does not include broken rock placed directly on the sewer, which never should be done.) In fact,

when this condition of soil stability around the sewer has been reached in the case of clayey or loamy soils, the sewer itself could be removed if a small one and the soil might not at once collapse; immediate collapse being generally less probable the less the soil approximates a fluid condition. In any case, when soil stability has been reached a sewer could be pretty badly cracked without collapsing.

The critical period of a sewer is its first few months, while the soil is settling and the cement (if it is a concrete or brick sewer) has not reached its maximum strength. These once passed, collapse is likely to occur only through a movement of the soil that destroys its stability, as by an excavation nearby, a broken water main, growing tree roots, etc.; or by the action of an acid or alkali in the sewage, or some other agent of chemical action which destroys all strength of the sewer wall.

But a sewer must possess some strength and when first laid this may need to be considerable. Just what, is one of the most difficult of determinations because of the difficulty of learning the pressures exerted by unstable soil and the local variations in such pressures. Determining the strength of a pipe or sewer to resist any assumed kind and degree of pressure is comparatively simple.

Probably the most elaborate series of experiments ever conducted in an effort to learn the principles and factors involved has been conducted by Iowa State College. Results of the first series were given in "Municipal Journal" for February 23, 1918; further conclusions are given in an article in this issue. These refer only to circular pipes, but many of the principles apply to brick and concrete sewers also. Brick sewers have little beam strength, however, but act largely as a voussoir arch; while a reinforced concrete sewer acts more like a sewer pipe, with considerable internal strength to resist distortion.

One fact brought out is that external pressure likely to cause distortion or cracking may, when soil conditions are unfavorable, be reduced a third by surrounding the sewer with sand or other material that runs freely—a suggestion that may sometimes be practicable and worth while.

Municipal Bonds

Although nearly seventy million dollars of municipal bonds were sold in January, the demand caused an upward tendency of prices. Chicago floated more than eleven million at 4 per cent; Oregon half a million at 4½ per cent; Cincinnati, Detroit, Rochester and Philadelphia more than ten million at 5 per cent.

The total amount, as compiled by the "Daily Bond Buyer" was \$66,474,961. This is less by twenty million than the sales of January, 1920, but larger than any other January except 1914. The rate is still rather high compared with pre-war conditions, but not sufficiently so to prevent the issuing of bonds (for short terms—5 or 10 years—if thought desirable, to be refunded later at better rates) for carrying out any needed public works.

A Notable Engineering Distinction

The American Society of Civil Engineers has awarded the Norman Medal for 1920 to Dr. J. A. L. Waddell for his paper on the "Economics of Steel Arch Bridges" which, in competition with all of the other important papers presented to the society during the year 1920, was judged worthy of special commendation for its merit as a contribution to engineering science.

This medal is one of the most important recognitions conferred on civil engineering research by the great national society that stands for the highest technical ability in this country. The fact that it has now been awarded for the third time to Dr. Waddell is without precedent in the history of the medal and is a worthy recognition of Dr. Waddell's indefatigable research, analysis and able presentation of various important engineering topics on which he has written.

There have been fifty awards of the medal; forty-five engineers have received one medal, four engineers have received two medals, but Dr. Waddell is the first to receive three medals.

Coarse Sand in Road Construction

In Indiana, aggregate producers were having difficulty in getting material to meet the specifications of the state highway commission of that state for gravel aggregate for concrete roads. The specifications called for coarse aggregate from $\frac{1}{4}$ inch up, permitting a tolerance of only 5 per cent material passing the $\frac{1}{4}$ -inch screen. The Indiana gravel banks have an excess of coarse sand. To relieve this situation a long series of tests was undertaken by Purdue University under the direction of Professor W. K. Hatt, and while the results of the tests are not as yet completely known, it is indicated that in concrete of the richness used in roads, comparatively high percentage of this coarse sand may be used without decreasing the strength of the concrete. As a consequence the new specifications may allow a tolerance of 15 per cent of material passing the $\frac{1}{4}$ -inch screen in the coarse aggregate.

Dr. J. A. L. Waddell Receives Norman Medal for Third Time

The American Society of Civil Engineers has awarded the Norman Medal for 1920 to Dr. Waddell for his paper entitled "The Economics of Steel Arch Bridges." The previous awards to Dr. Waddell were in 1909 on his paper "Nickel Steel for Bridges," and in 1916 on his paper "The Possibilities in Bridge Construction by the Use of High Alloy Steels."

The Norman Medal was instituted and endowed in 1872 by the late George H. Norman, member of the American Society of Civil Engineers. The code of rules governing the award require that: "All original papers presented to the society by members of any class, and published in the Transactions during the year for which the medal is awarded, shall be open to the award, provided that such

papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the society, nor have been published in the Transactions in any previous year.

"The medal shall be awarded to a paper which shall be judged worthy of special commendation for its merit as a contribution to engineering science."

Joseph C. Rock

Joseph C. Rock died at his residence, 1340 Madison avenue, January 26, at the age of 75, after a lingering illness of seven months.

Mr. Rock was general agent of the United States Asphalt Refining Co. and was for many years an official of the Barber Asphalt Co. He was one of the pioneers of the asphalt paving business and introduced this class of pavement throughout many cities in the United States twenty-five years and thirty years ago and on this account he was well known throughout the country. He also was president of a company which did a large amount of asphalt paving for the borough of Manhattan.

At the outbreak of the Civil War, although only 15 years of age, Mr. Rock joined a Vermont regiment and served throughout the Civil War.

Subsequently he was connected with several government departments in Washington and while with the Bureau of Engineering in the District of Columbia he removed to New York in 1889 to accept the post of secretary with the Barber Asphalt Paving Co.

He is survived by a granddaughter, Miss Elizabeth R. Brackett, and several brothers and sisters.

The interment was at Washington, D. C., Saturday, January 29.

F. S. Wardwell

Frederick Schuyler Wardwell, an eminent civil engineer and contractor and a prominent citizen of Stamford, Conn., died in that city after a short illness January 15. He built trolley and street car lines in the east and in the west and later electrified some of them. For the past twenty years he was principally engaged in harbor improvements, water-front construction, dredging and general contracting. He was very successful in laying large submerged water mains, some of which he installed under difficult conditions and at a great depth. He did a considerable dock work and was especially successful in various kinds of submerged construction. He purchased, built, equipped and improved a large plant, including a number of dredges, derrick boats and other floating equipment for harbor work.

He was prominent in local, civil and civic affairs and was a member of the American Society of Civil Engineers, Connecticut Society of Civil Engineers, past president of the Stamford Engineering Club and was associated with public improvements and business interests.

Construction Questions Answered

Suggestions as to methods, "wrinkles" and appliances that may be used to overcome difficulties arising in construction work. We invite questions concerning such problems that may arise from time to time in the experience of any of our readers. Answers prepared by competent authorities will be published promptly. It is hoped that others who have solved similar problems different will send us their solutions for publication also; or describe new "wrinkles." If it is only a new way to drive a nail, it may help some one.

How Can a Builders' and Contractors' Get-Together Club Be Organized and Financed?

The character and purposes should be suggested to a circle of friends and associates, a meeting called, temporary chairman appointed, preliminary officers selected, pre-arranged constitution be submitted to committee, amended and adopted and signed by those present. Legal incorporation is optional and may be delayed. The small necessary expenses may be met by preliminary contributions and by very moderate initiation fees and dues.

Ohio, January 14, 1921.

Editor, PUBLIC WORKS.

Dear Sir: We are endeavoring to organize a builders' association here. I have been appointed on a committee to find out what would be the best rules and regulations and also by-laws for such an organization.

We wish to take in Carpenter, Brick, Stone, Painting, Plastering, Electrical, Roofing, Tinning, Concrete, Excavating, in fact, any kind of contractor or superintendent over either the entire job or any portion of the work.

We do not wish to set this organization up as a price-fixing body, but as a get-together club for mutual benefit.

We do not wish to be exclusive, but would like to have some suggestions who should be asked as members and who kept out.

We would like some information as to how to finance such an organization.

We would like to know if an organization of this nature would be legal and if properly managed might prove of benefit to the members.

If we are not asking too much of you in this matter, could you refer us to some authority on the subject. Thanking you, I remain,

Very truly yours,
CONTRACTOR AND BUILDER.

A get-together association of men interested in building operations should be easily organized and maintained in any town large enough to have a number of individuals or firms engaged in each of the principal trades. Meetings at regular intervals should very much promote good fellowship, the adjustment of misunderstandings or differences, the exchange of experience and helpful suggestions for difficulties.

If properly started on the right lines and promoted by a few vigorous, persistent members it should be a success from the first and steadily grow, soon becoming an important local institution with recognized social and business influence.

INCORPORATION OPTIONAL

There are no legal difficulties to the creation and maintenance of such an institution, and no formalities are indispensable if it is to be purely of a social and informal nature. If, however, provision is made for permanent development, the association will naturally wish to hold some property and be responsible and have recognized legal standing, in which event it should be incorporated under the laws of the State.

Incorporation can be accomplished at any future time with very little trouble or expense. Copies of the incorporation laws and application blanks can be had by request of the Secretary of your State and can be filled out by one of your members or the entire work can be done at small expense by any satisfactory local lawyer.

PRELIMINARY ACTIVITIES

To begin with, a circular letter might be simultaneously mailed to the different individuals that you would like to have associated in this organization. The letter should fix the day and hour at which a meeting is called at a private residence, any public room that is available, or the rooms of any existing club or organization which would probably be cheerfully offered for the purpose.

The letter should state very briefly the purpose of the meeting, namely to consider the organization of a local club or social and informal business meetings connected with the different branches of construction, for the purpose of keeping up to the times and affording mutual benefit and promoting good understanding among members and improved methods, operations and general business prestige.

Previous to the meeting, conferences should be held with some of the representative men invited and they should be requested to be prepared at the meeting to state how such an organization could help their business and what they would like to have it do and what they would like to have it avoid. They will willingly contribute a few dollars for preliminary expenses, if these are necessary, and should ultimately be reimbursed when the club collects fees and dues.

THE FIRST MEETING

A few of the best men, and those who are known to be harmonious with each other and with the promoter of the organization, should be consulted in advance and one of them should be prepared to nominate from the floor a temporary chairman. When nominated, he should request some one present (or some member may well have his stenog-

rapher there for that purpose) to act as secretary pro tem. This having been done, some other person will be prepared to move that the officers be duly elected for the evening, and after this has been accomplished another member, also previously prepared, should propose the names of three or four men to serve as a committee on constitution.

One of these members should be previously provided with a simple and comprehensive outline of a constitution, as brief as possible and covering only essential points. When this is approved or modified by the committee and put before the meeting it will probably be adopted and then, as soon as those present have signed it and paid their initiation fee, they will become charter members, after which subsequent membership will be by regular process of application, consideration and voting. The election of officers should follow immediately and the appointment of standing committees, and the organization will be in full working order.

FUTURE DEVELOPMENT

This procedure involves no legal obligation and need not follow closely the suggestions above named, which may be modified, omitted or extended at pleasure and are only given to serve as a sort of basis from which you can easily make any changes or development suited to your preferences or local conditions. Under such an arrangement the club can function either for social or business purposes or both, and can expand or change as much and as long as you please and can at any time be incorporated without material change, in the manner at first mentioned.

A certain amount of formality, without irksome restrictions or requirements, is desirable to give the club greater dignity and impress its value on the members and in order to have regular operations.

Whenever the size and prosperity of the club makes its permanent home necessary, it will be easy to finance it by moderate subscriptions and by issuing small denomination bonds which will be purchased by members and their friends.

MODELED ON SIMILAR ORGANIZATIONS

A good way to plan the constitution and general features of the club would be to borrow a copy of the constitutions of all the social or business organizations at hand and compare them, selecting here and there any feature that it is desirable to adopt, modify or reject. These will give sufficient hint for anyone interested in the matter to compile a trial constitution that can be discussed and modified and perfected by the committee and can at any time after its adoption be amended by the club itself.

There are associations of builders and contractors in most large cities and towns, and if these are not known to you many responses would probably be obtained by simply writing a circular letter addressed to the builders' or contractors' club of any city or large town you may select. Among the important organizations of this kind there are following, The Master Builders' Association, Boston, W. H. Sayward, 77 Summer St., Secretary; The Builders' Exchange, Akron, O., P. P. Gott, 213 Second National Bank Bldg., Secretary; The Builders' Association, Chicago, Ill., T. M. Craig,

Secretary, Chamber of Commerce Bldg.; The Contractors' Association of Public Works, Cincinnati, O., Frank Polking, 110 Odd Fellows Temple, Secretary; General Contractors' Association, Louisville, Ky., George A. Brinke, Secretary, 400 Realty Bldg.; General Contractors' Association, Memphis, Tenn., E. W. G. Meers, Secretary, Scimitar Bldg.; Northern California Contractors' Association, C. H. Gray, Merchants' National Bank Bldg., San Francisco, Secretary; Builders' and Contractors' Association, Norfolk, Va., K. D. Briggs, 231 Arcade Bldg., Secretary; Builders' Exchange, Pittsburgh, E. M. Tate, 270 Fulton Bldg., Secretary; Master Builders' Exchange, Harry C. Woods, 18 S. 11th St., Secretary; and Master Builders' Association, Wilmington, Del., James E. Stein, No. 4 West Ninth St., Secretary.

FINANCING

If your club is started with a constitution and regularly elected officers and a dozen or more members it can easily be financed by the collection of a very moderate initiation fee of from one to five dollars each from the members, plus the dues for the first year if necessary or a small assessment if preferred.

If the formalities are dispensed with a few five dollar contributions from men interested in the idea will be amply sufficient to pay for postage, stationery and typewriting and for the rent of the meeting place if the latter cannot be donated by some one interested in the movement. The officers will doubtless serve without compensation and care should be taken to elect a secretary who has a regular stenographer or typewriter who can easily take care of the minutes of the meeting and send out notices without involving any expense to anyone.

LIBRARY AND MEETING ROOM

One of the first things should be the commencement of a library by invitation to members to donate books, drawings, pictures, specifications and files of periodicals and current publications as fast as they are read.

A circular letter should also be addressed to similar organizations and technical societies throughout the country requesting them to donate copies of their publications in exchange for any publications that you may or may not be able to produce in the future.

Local papers will probably be willing to give a free copy of their paper and thus a considerable amount of valuable and interesting reading matter can be secured and maintained and can afterwards be supplemented by subscriptions when the club can afford it.

This of course can only be accomplished if the club has a regular meeting place where there should be one or more tables and cases provided and supplied with stationery and pen and ink, thus making it a very convenient place for members to consult files, to write an occasional letter or hold conferences that are not convenient in their office.

This implies a locked room with a key for every member or, when the club can afford it, an attendant who may have the privilege of carrying on some unobjectionable occupation and be paid a nominal sum for his light services.

Immigration Notes

The Chamber of Commerce of the State of New York went on record January 20 in favor of the Johnson bill to restrict immigration for one year and adopted resolutions for support of the bill as an emergency measure pending the preparation of perfected legislation to give the United States a system of selective immigration.

A new plan for regulating immigration to the United States and differentiating desirables from undesirables at the source has been presented to the Senate Immigration Committee by Harry A. McBride, chief of the vise section of the State Department. He recommended the creation by the government of a commission to have general supervision of immigration and to work in co-operation with the existing agencies of the State and Labor Departments.

The commission would direct immigrants to places in the United States where they were most needed. The problem of selection would be solved by using the vise system and having American consuls abroad write the prospective immigrant's occupation, destination and other qualifications as a part of the passport vise.

National Federation of Construction Industries Opposes Johnson Immigration Bill

The National Federation of Construction Industries has sent out an urgent appeal signed by President Ernest T. Trigg, presenting the principal features of the Johnson Immigration Bill that has already passed the House of Representatives and is now being considered by the Senate Committee on Immigration, and showing why the bill is unnecessary and injurious.

The Johnson Bill proposes the complete exclusion of immigrants for twelve months, thus making a dangerous entering wedge, jeopardizing all future supply of alien labor that will always be so much needed in this country. It makes permanent the present onerous war-time passport restrictions. It is destructive rather than constructive and would operate to admit non-productive classes and exclude strong and willing workers that are needed. The report of the House Committee was biased in favor of the exclusionists and disregarded the needs of all industries, including agriculture, for able-bodied labor and the bill was railroaded through the House of Representatives without consideration of its effect on industry in the United States.

Official statistics published after the bill had been passed by the House of Representatives, show that for the fiscal year ending June 30, 1920, the net gain by immigration was 141,686, of which only 9,877 were permanent alien male population. In 1920 the unskilled laborers emigrating exceeded those immigrating so as to cause a net loss of 102,088.

The immigration committee intends to promote the enactment of liberalized legislation which will exclude the unfit, dependent and non-producing classes and admit the strong, healthy, able-bodied workers that are essential to the economic system of the United States because very little unskilled labor is to be found among American-born citizens who are educated to higher standards of occupation. The Johnson Bill is a dangerous menace and considered to be the entering wedge of the exclusionist policy fostered by enthusiasts and backed by organized labor.

Exaggerated Estimates of Unemployment

An article recently appeared in "Labor" in which it was claimed that there were, on January 1, 2,325,000 unemployed industrial workers in this country, including: Building trades, 300,000; automobiles, 250,000; textiles, 225,000; clothing, 150,000; railroads, 200,000; steel and iron, 150,000; shipping, 125,000; food products, 100,000; amusements, 75,000; metal mining, 50,000; shipbuilding, 50,000; rubber, 50,000; shoe and leather, 50,000; printing, 50,000; casual labor, 50,000.

Frank Morrison, secretary of the American Federation of Labor, says that reports just received from labor officials in 141 cities show the total number of unemployed in those places to be 1,819,272.

The unemployed in New York are claimed to be 300,000; Detroit, 150,000; Philadelphia, 235,000; Baltimore, 20,000; Chicago, 200,000; Cleveland, 118,000; St. Louis, 4,000; Boston, 50,000; Milwaukee, 40,000; San Francisco, 15,000; Seattle, 9,000; and Pittsburgh, 20,000.

500 Indictments Expected

It was announced January 24, that "at least 500 indictments, and possibly more, may be expected before the Lockwood building investigation concludes. . . . The indictments will probably be returned within a month or two. Up to the present time 150 indictments have been handed down by the State and Federal Grand Juries. Trials are expected to begin in the state courts shortly, with as many cases on trial at the same time as the available judges and court accommodations will permit."

According to the "Industrial News Survey," the official organ of the National Industrial Conference Board, the peak, on January 15, of unemployment in the industries of the United States appeared to have been passed. Resumption of operation is announced by many plants that were shut down at the end of the year, and increased operation has begun in others that have been working on short time. The movement is not yet believed to be of a very decisive character, but it has been sufficient to check the slow but steady increase of unemployment that has been manifest during the past six weeks. Several large industrial centers report less unemployment than a week ago.

Recent Legal Decisions

INJURY ON STREET—PROXIMATE CAUSE—NOTICE OF DEFECTIVE CONDITION

The burden of proof of negligence as the proximate cause of an injury on a street, for which a city and its repair contractor is being sued, rests on the plaintiff. In such an action for injuries to a woman who stepped into a hole or sink over an old catch-basin, the Texas Court of Civil Appeals holds, *Peterson v. City of Houston*, 224 S. W. 580, that evidence that the street repair contractor's failure to plug a pipe might have been the cause of the sink was insufficient to take the case to the jury. Assuming that the evidence was reasonably sufficient to carry the case to the jury on this point, it was held that on the authority of *City of Houston v. Vatter*, 23 Tex. Civ. App. 298, the plaintiff could not recover. In that case it was held that a city charter provision that a city shall not be liable for injuries caused by streets being out of repair unless they shall have so remained ten days after notice to the city in writing, is valid and a bar to recovery where the required notice has not been given.

ONE-WAY STREET ORDINANCE FOR AUTOMOBILES HELD VALID

The Kentucky Court of Appeals, in *Commonwealth v. Nolan*, 224 S. W. 506, holds that, in view of Ky. St. Supp., par. 3562, giving councils in cities of the fourth class exclusive control over streets, an ordinance of such a city, confining the operation of all motor vehicles on one of its streets, between specified streets, to travel in one direction, on account of the narrowness of such street, is a valid exercise of the police power, not being special legislation or discriminatory. Such an ordinance, designed to protect the safety or health of the public, and necessary for its protection, will not be declared invalid by the courts merely because its enforcement will subject to inconvenience a single person, a considerable number, or an entire community of persons. Whether such an ordinance is valid or otherwise had not been passed on before in Kentucky. The court held that it could not be unconstitutional merely because it legislates solely upon the operation of motor vehicles, and failed to regulate the operation of all other vehicles using the same street. It cited authorities in other jurisdictions authorizing the exclusion of automobiles from certain streets, but refused to go as far as to hold that they might be wholly excluded from the use of any road used by other vehicles.

PURCHASE OF LAND FOR WATER WORKS BEYOND FIVE-MILE LIMIT INVALID UNDER CITY CHARTER

The Oklahoma Supreme Court holds, *Brady v. Hubbard*, 192 Pac. 567, that where a city of that state is granted a charter form of government and adopts a charter for its municipal government, such charter constitutes the organic law or constitution of such city in its municipal affairs, and the powers, rights, and limitations

which the people of such city vote to themselves in the adoption of such charter are binding upon them until amended or repealed. Where a city charter contains a provision which limits the city, in the purchase or lease of land for a water works system, to within five miles from the city limits, a proposition to vote bonds for the purchase of lands beyond such five-mile limit is invalid. In this case it appeared that property sought to be purchased by the city of Tulsa for water works lay some 55 miles outside of the city limits. It was held that under the provisions of the city charter the proposition was invalid.

OFFICERS PERSONALLY LIABLE FOR FAILURE TO REQUIRE PUBLIC WORKS CONTRACTOR'S BOND

The Michigan Supreme Court holds, *Lake Shore Stone Co. v. Westgate*, 179 N. W. 264, that officers of a municipality who fail to require a contractor's bond in letting a contract for the construction of public buildings or other public works, as required by the Michigan statute, are personally liable to laborers and materialmen injured thereby. In a materialman's action against members of a town board for failure to require a contractor to give such a bond, it was held no defense that the board had been advised by the materialman's agent, with whom it had no legitimate business to transact, that a bond was unnecessary, where the members had sufficient knowledge to put them on inquiry as to its necessity.

CITY NOT LIABLE TO TRAVELER ASSUMING RISK IN FOG

The Washington Supreme Court holds, *Thompson v. City of Bellingham*, 192 Pac. 952, that a city which has been forbidden by the state public service commission to place barriers nearer than five feet to the rails of a street car track leading off a street onto a trestle is not liable for injuries suffered by a traveler who, knowing the situation, drove onto the trestle in a dense fog.

PUBLIC WORKS CONTRACTOR'S BOND DOES NOT COVER EQUIPMENT RENTED AND NOT USED

The Oregon statute requiring a public works contractor's bond concerns every approximate relation of the contractor to the work which he has contracted to do. But it is the labor and material supplied for the prosecution of the work which is protected and not some obligation incurred by the contractor which does not approximate the construction contracted to be done. The Oregon Supreme Court holds, *City of Portland v. O'Neill*, 192 Pac. 909, that the statute should not be interpreted so as to permit a contractor on public work to lease an equipment and use it for a short time or not at all, abandon the work without returning the rented apparatus to the lessor, and allow the rental to accumulate for a long time, and be counted as an expense protected by the statute and bond. Such is not the letter or spirit of the law.

Pavements Laid During 1920

In the issue of February 5 we published data from about six hundred cities giving conditions throughout the country as to labor; also information concerning failures of pavement bases in several hundred cities. At the time of collecting this information we also obtained figures of the amount of each kind of pavement laid in the several cities, but for these there was no room in

that issue. We will give them in tabulated form in the next few issues of PUBLIC WORKS, beginning with this one.

The figures refer to the pavement laid in city streets only, and not roads outside of cities. (The latter will be treated of separately in a few weeks.) The kinds of pavements include, besides those given on this page, tar macadam, Amiesite, stone block, brick, wood block, concrete, plain macadam, and gravel. Future issues will contain figures for these, as well as those for all pavements which were not received before January 20, at which date tabulation of this table was begun.

PAVEMENT LAID DURING 1920

Quantities are square yards or miles unless otherwise indicated.

Cities and States	Sheet Asphalt	Asphalt Concrete	Tar Concrete	Bitulithic	Bitoslag	Rock Asphalt	Warrenite	Willite	Asphalt Macadam
Alabama									
Andalusia				27,000					
Bessemer				10,000					
Arizona									
Tucson				25,691.55					
Arkansas									
Ft. Smith		25,000							
Little Rock		4,000							
California									
Bakersfield							77,390		
Napa									9,040
Oroville									
San Francisco	63,402	138,107					29,975		
Santa Monica	26,714			160,949					
Venice	½								
Colorado									
Denver		154,500						9,900	
Pueblo				43,915					
Connecticut									
Hartford	16,000								
Meriden					8,025				
New Haven	78,685	6,895							
Orange	13,500								29,980
Putnam									6,500
Southington									1,500
Wallingford		10,000					6,000		
District of Columbia									
Washington	49,227								
Georgia									
Albany		51,000							
Atlanta								25,000	
Idaho									
Idaho Falls				175,000					
Rupert				28,000					
Illinois									
Chicago	420,363	345							210,730
Joliet		2,235							
La Grange		110,000							
Winnetka									1,400
Indiana									
Bicknell	23,264								
Elkhart	19,700								
Fort Wayne	54,661	23,489							
Gary	95,043.94								
La Porte	19,183.5								4,048.7
South Bend	101,846	64,012							2,235
Iowa									
Albia				19,900					
Cedar Rapids		13,869.54							
Charles City		60,000							
Cherokee	70,434								
Davenport		81,277							
Fort Dodge	30,150	27,450							
Reinbeck				40,000					
Villisca		29,880							
Waverly				15,000					
Kansas									
Osawatomie		17,913.3							
Wichita	114,777	103,817							
Winfield	6,300	1							
Kentucky									
Owensboro		48,000							
Richmond	2½								
Louisiana									
South Highlands		20,000							
Maine									
Bangor			2,900						
Portland		4,650.9							
Massachusetts									
Andover									1-3
Attleboro		3.73							1,250
Boston	52,383	58,804		12,296					½
Braintree		½							18,040
Brockton		6,581							1,480
Brookline				7,926					28,399.5
Chicopee									6,500
Lexington									50,000
Lynn						3,220			
Wakefield									
Waltham									

(To Be Continued)

NEWS OF THE SOCIETIES

Feb. 14—AMERICAN ENGINEERING COUNCIL, Technology Club, Syracuse, N. Y. Headquarters at Onondago Hotel.

Feb. 14-16 — NATIONAL CIVIC FEDERATION. 21st annual meeting, Hotel Astor, New York.

Feb. 14-16 — AMERICAN CONCRETE INSTITUTE. Annual meeting. Auditorium Hotel, Chicago, Ill. Secretary, Harvey Whipple, New Telegraph Building, Detroit, Mich.

Feb. 15 — BUFFALO SECTION, AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Technology Club, Syracuse, N. Y.

Feb. 15—COUNCIL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Technology Club, Syracuse, N. Y.

Feb. 15-17 — PROVINCIAL ASSOCIATION OF CONTRACTORS AND SUPPLY DEALERS OF ONTARIO. Startford, Ont.

Feb. 16-18 — AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Seventh midwinter convention. Engineering Societies' Building, New York City.

Feb. 21-23 — MINNESOTA SURVEYORS' AND ENGINEERS' SOCIETY. Annual convention. Hotel Commodore, St. Paul.

Feb. 25-26—CONSTRUCTION DIVISION, U. S. ARMY. Annual reunion of those identified with this division during the war. Morrison Hotel, Chicago, Ill.

Feb. 28 — PHILADELPHIA SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Engineers' Club of Philadelphia.

Feb. 28 — CHICAGO SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

March 11-12 — NORTHWESTERN ASSOCIATION OF GENERAL CONTRACTORS. St. Paul Hotel, St. Paul, Minn.

March 14—AMERICAN ASSOCIATION OF ENGINEERS. The third annual railroad conference. Chicago.

April 27—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual convention. Houston, Texas.

April 27-29—UNITED STATES CHAMBER OF COMMERCE. 9th annual meeting. Atlantic City, N. J.

May 9-11—AMERICAN ASSOCIATION OF ENGINEERS. 7th annual convention. Buffalo.

May 17-19—NATIONAL FIREMEN'S ASSOCIATION. Twenty-third annual convention. Fort Wayne, Ind.

June—CONFERENCE OF MAYORS AND OTHER CITY OFFICIALS, State of N. Y. 12th Annual Conference. Elmira, N. Y.

June 6-10—AMERICAN WATER WORKS ASSOCIATION. Annual convention at Cleveland, Ohio. Secretary, J. M. Diven, 153 West 71st St., New York.

June 7-9—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting. San Francisco, Cal.

Oct., 1921—IOWA SECTION, AMERICAN WATER WORKS ASSOCIATION. Seventh annual meeting.

SEVENTH ANNUAL ROAD SCHOOL OF PURDUE UNIVERSITY

The seventh annual road school of Purdue University, co-operating with the Indiana County Highway Superintendents' Association and the Indiana State Highway Commission, was held at the University of Lafayette on January 18, 19 and 20. The topics especially considered were: Road maintenance, road systems, testing and inspection of roads and road materials, and highway transportation.

MID-WESTERN HIGHWAY AND TRANSPORT EDUCATION CONFERENCE

Under the auspices of the Permanent Committee on Highway and Highway Transport Education, the University of Michigan and the Michigan State Highway Department, a Mid-Western Conference on Highway and Highway Transport Education, will be held in Ann Arbor, Mich., February 23.

Program: 10 a. m., "The Highway and Social and Economic Welfare," by Dr. P. P. Claxton, chairman of the Permanent Committee; "The Educational Activities of the Permanent Committee," by Professor C. J. Tilden, director of the Permanent Committee; "The Economics of Highway Transport," by Roy D. Chapin, vice-president, National Automobile Chamber of Commerce; "Highway and Highway Transport Education in Secondary Schools," by George C. Diehl, chairman, Good Roads Board, American Automotive Association; "Safety First Education in Secondary Schools," by Harriet E. Beard, supervisor of safety education, Detroit Public Schools.

2 p. m., "The Measure of Highway Accomplishment," by Thomas H. Macdonald, chief, United States Bureau of Public Roads; "The Army's Highway Transport Problem," by Col. Mason M. Patrick, Corps of Engineers, U. S. Army; "The Inter-relationship of Waterway, Railway and Highway Transport," by Professor Henry E. Riggs, Professor of Civil Engineering, University of Michigan; "Snow Removal from Transport Routes," by Charles J. Bennett, State Highway Commissioner of Connecticut; "The Economic Value of Highway Transport Surveys," by Professor Arthur H. Blanchard, Professor of Highway Engineering and Highway Transport, University of Michigan.

Dinner in the banquet hall of the Michigan Union, 6 p. m. After dinner addresses: "Highway Transport and the Industry," by Tom Synder, secretary, Indiana Highway Transport and Terminal Association; "Inter-relationship of Highway Transport and the Back-to-the-Farm Movement," by A. R. Kroh, Development Department, Goodyear Tire and Rubber Company. 8:30 p. m., concert by the University of Michigan Band; address, "The Trinity of Transportation," by the Hon. William C. Redfield, former secretary of Commerce of the United States; "What's Your Hurry," Wallace Reid in a motion picture story of highway transport.

IOWA ENGINEERING SOCIETY

A meeting of the Iowa Engineering Society was held on January 18-20 at Des Moines, and was well attended, more than 400 engineers and their friends being present and 40 exhibitors. The three sections, municipal, drainage, and highway, held their meetings simultaneously.

The society voted unanimously to become a charter member of the Federated American Engineering Societies. The State Legislature was petitioned

equipped geological survey. Standard forms for engineering contracts, paving, sewers and water works were submitted by a committee of that name headed by M. G. Hall.

The following officers were elected for next year: President, J. H. Dunlap; vice-president, Alvin Le Van; and new director, J. D. Wardle. The successor to Mr. Dunlap, who was secretary of the society since 1914, will be chosen by the board of directors.

VIRGINIA GOOD ROADS ASSOCIATION

The annual meeting of the Virginia Good Roads Association was held in the Hotel Roanoke, Roanoke, Va., on January 26, 27 and 28. The principal topics of discussion were highway problems in Virginia and the opportunity for greater road development in the state as a result of the adoption of the good roads amendment to the state constitution. Among the speakers were D. D. Hull, Jr., president of the Lee Highway Association; James W. Brooks, director of the educational bureau of the Federal Highway Council; Wade H. Massie, chairman of the Virginia State Highway Commission; George P. Coleman, state highway commissioner of Virginia; and C. C. Vaughn, Jr., president of the Virginia Good Roads Association.

MECHANICAL ENGINEERS

The spring meeting of the American Society of Mechanical Engineers will be held at the Congress Hotel, Chicago, May 23-26.

Sessions are planned by the Professional Sections on Aeronautics, Fuels, Management, Material Handling, Machine Shop, Power, Forest Products and Railroads.

ST. PAUL ENGINEERS' CLUB

At the annual meeting of the St. Paul Engineers' Club on January 10 the following officers were elected: President, John H. Mullen, deputy commissioner of the State Highway Commission; vice-president, W. W. Walker; treasurer, William N. Carey; member of the Minnesota Joint Engineering Board, William C. Armstrong.

PERSONALS

Blanchard, A. H., consulting highway and transport engineer, Ann Arbor, Mich., has been retained by the city of Colorado Springs in connections with its \$1,200,000 paving program.

Searcy, Victor, has been appointed county engineer of Wood county, Tex., to succeed S. B. Davis, who resigned.

Shafer, Wallace H., has been appointed road superintendent of Armstrong and Clarion counties, Pa.

Morarity, Maurice P., has been appointed assistant city engineer of St. Paul, Minn., and will be in charge of street grading, sewer and sidewalk work.

Myles, L., of Toronto, has been appointed county engineer of Victoria county, Ont., with headquarters in Guelph.

Edwards, Llewellyn N., has been appointed bridge engineer of the State Highway Commission of Maine, with headquarters at Augusta.

New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations



ROAD PLANER DRAWN BY TRACTOR IN SERVICE

KINNEY ROAD PLANER, JONES PATENT

This machine is the invention of Richard A. Jones, for many years street commissioner of the city of Waltham, Mass. The Kinney Manufacturing Co. has acquired full rights for the manufacture and sale of this equipment.

The Kinney road planer is especially designed for use on bituminous roads and highways. It is adapted for planing or leveling the waves or ridgy elevations that frequently appear on the road surface. The machine is a combination drag, planer and scarifier, constructed entirely of metal, and weighs about three and one-half tons. It may be drawn by a steam roller or tractor. The machine is mounted on steel runners equipped with removable cast iron shoes and of ample length to cover or cross the road waves without following the contours of the surface. Upon the runners is mounted an oscillating iron plate, holding the planer knives and scarifying chisels or picks, all adapted for adjustment by hand-oper-

ated screws to meet the varying conditions of the road surface. For moving the machine to a distance or from one job to another, steel wheels are provided, equipped with lifting screws by means of which the entire machine may be raised upon the wheels for transportation. When in actual service, the machine is lowered and moved upon the runners. The machine has a double equipment of picks or planer knives and may be drawn backwards or forwards without being turned upon the runners.

This machine removes the bunches or ridgy elevations from the road surface without destroying the general contour of the road. The facilities for adjustment of the scarifiers and planers in any desired angularity or depth of cut, will fully meet the different conditions arising from changing temperatures or varying viscosities of the material used in the construction of the road. While designed especially for use on bituminous surfaces, the planer may also be used to good advantage on macadamized or dirt roads.



ROAD PLANER SWUNG FROM TEMPORARY WHEELS FOR TRANSPORTATION

In the New Hampshire Highway Department, where this machine has been thoroughly tested under severe conditions, it has been shown that, by the use of one machine during the past season, a saving of many thousands of dollars has been effected as compared with the expenditures involved in the usual method of reconstruction and renewal.

PIPE MACHINES

A catalogue just issued by the Williams Tool Company illustrates eight pipe and bolt threading machines for diameters of $\frac{3}{8}$ inches and up to 18 inches. All of them have rigid cast lathe beds which, for the smaller sizes, are supported on braced legs and for the larger sizes on short pedestals or are seated directly on the foundation. All are furnished with belt drives and all but the two smallest sizes can be furnished with motor drives. The catalogue gives general description and specifications of each machine, together with numbered illustrations of spare parts to facilitate repair orders. The No. 1 machine with a capacity of $\frac{1}{4}$ inch to 2 inches is furnished with a crank for hand power, No. 1 and No. 2 have cutting off attachments.

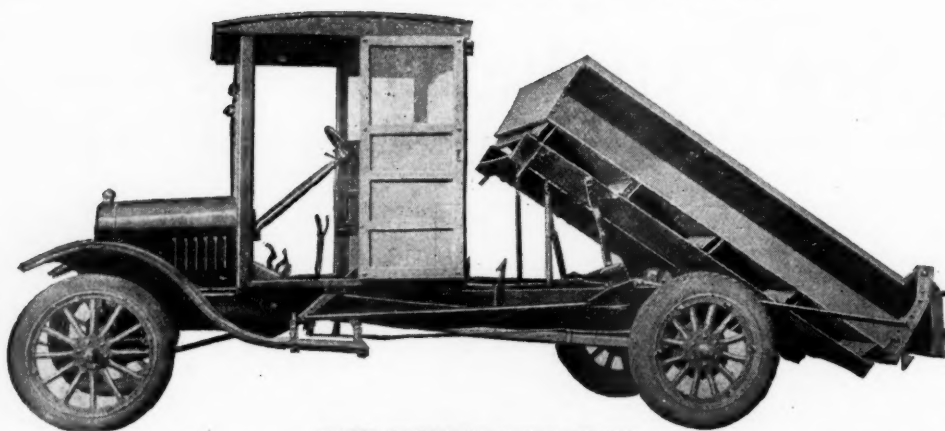
IMPERVITE WATERPROOFING

A bulletin issued by the Standard Paint Company describes the uses and advantages of Impervite, which is a white paste with a paraffin base and is shipped in 25-pound and 100-pound cans and 450-pound barrels, recommended for use in waterproofing floors, walls and mass concrete. Specifications are given for its mixture with cement mortar and application as a permanent coat to the inner surface of concrete construction, for its application and mixture with the cement and aggregate in mass concrete, and for mortar used in non-cracking stucco.

ALL-STEEL DUMP BODIES

The Providence Body Company has issued a folder illustrating an all-steel dump body that can be used as an ordinary dump body with tail gates swinging from the top for stone, sand, gravel or other heavy materials. When the body is required to carry coal, a side extension may be used. If the body is to be used for lumber or other bulky materials, the sides can be removed and tail gates suspended at floor level.

Specifications call for the floor to be covered with 10-gauge steel, the tail gates to be hinged at top and bottom, and the tail gate opening device to be operated from the front of the body. The standard sizes are 9 x 5 feet, 10 x 6 feet and 10 $\frac{1}{2}$ x 6 $\frac{1}{2}$ feet. All of them are 27 inches high and with capacities of 54, 81 and 108 cubic feet, that can be increased by a 4-inch extension to 70, 100 and 125 cubic feet and by a 12-inch extension to 99, 140 and 170 cubic feet. All-steel dump bodies without extension sides and operated by Wood hydraulic hoists that are made of capacities from 54 to 215 cubic feet.



HAND DUMPING 1-TON TRUCK

ONE-TON TRUCK DUMP

An improved Ford dump mechanism, known as the Ford standard speed dump, has been perfected by the Standard Steel Works. It is designated for one-ton Ford trucks and is adapted particularly for quick hauls. The dump is operated from the driver's seat by a hand lever. No mechanism is connected with the truck power. An automatic locking device prevents the body from slipping back and the contents can be dumped at will by operating the hand lever.

In concrete work, crushed rock and sand can be mixed in loading the truck and dumped direct into the mixer. Cement can then be added and the batch is ready to mix. The new dump eliminates shoveling and wheeling to the mixer and saves waste of material. The capacity of the steel body varies from 27 to 40½ cubic feet, and it has a total weight of 450 to 550 pounds. The dumping device alone weighs 165 pounds. The dump can be installed on any Ford truck chassis in ten minutes.

INDUSTRIAL NOTES

Murdock, R. B., has resigned as executive engineer of the Asphalt Association and now represents the F. D. Cummer & Son Company of Cleveland and New York, manufacturers of asphalt paving plants and driers. The heavy demands for Cummer plants have necessitated this and other additions to their regular organization. Mr. Murdock has offices at 19 West 44th street, New York City, and is concerned with Eastern domestic and export sales.

CIVIL ENGINEERING FIRM ORGANIZED

Robert E. Horton, Harry Barker and Robert C. Wheeler have become associated under the firm name of Horton, Barker & Wheeler, to continue their consulting engineering practices formerly carried on under the names of Robert E. Horton, Consulting Hydraulic Engineer, Albany, N. Y., and Harry Barker and Robert C. Wheeler, Engineers, New York City.

The new firm will have its headquarters in Albany, with offices in New York and Harrisburg, Pa., and engineering laboratory at Voorheesville, N. Y., and will specialize in power devel-

opment and transmission, water supply, sewerage and sewage disposal, public utility rates and valuation.

Joel A. Thayer, for the past thirteen years superintendent of streets of the city of Taunton, Mass., has resigned to become the New England manager of the Acme Road Machinery Co., of Frankfort, N. Y., and assume the management of their Boston office at 141 Milk street, succeeding the late Wm. T. Becker, who had filled this position for many years past, and whose death occurred very suddenly on December 3 last.

S. J. Lehner, president of Lenher Engineering Co., New York, who assumed the general management of S. Flory Manufacturing Company, Bangor, Pa., upon the death of Mr. Samuel Flory, has been elected president of S. Flory Manufacturing Company, and will direct its affairs from the home office at Bangor.

The Austin Machinery Corporation of Louisiana, Inc. (\$300,000 capitalization) announces its incorporation under the laws of the state of Louisiana, as sole distributors for Louisiana, Arkansas, Mississippi, Tennessee, of the products of the Austin Machinery Corporation, manufacturers of contractors' equipment. This corporation will carry a full stock of machinery and spare parts for this territory, serving with dispatch the requirements of municipalities and contractors of excavation, construction, irrigation and drainage projects. General offices, 1020 Maison Blanche building, New Orleans, La.

The Goulds Manufacturing Co., Seneca Falls, N. Y., manufacturer of pumps, has appointed Edward S. Jenison as acting sales manager to succeed W. E. Dickey, who is retiring from business.

Increased efficiency of sawmill and woods labor in all sections of the south is reported by the Southern Pine Association. Notwithstanding reductions which have been made in the number of men employed by the companies, an increase in the output is shown. The number of colored men seeking work is much larger than heretofore, this be-

ing attributed to the fact that the negro is gradually realizing that he does not fit into northern industries and is returning to his old clime.

PERSONALS

Raymond, Fay M., has accepted a position as supervising engineer in charge of paving work in Neosho county, Kan.

Klorer, John, for eight years assistant state engineer of Louisiana, is now city engineer, New Orleans, La.

Evans, A. M., has resigned as city engineer of Norwich, N. Y.

Worrell, Capt. M. L., who was for three years in the Utilities Section, Construction Division of the U. S. Army has received his discharge, and has taken a position with the U. S. Bureau of Public Roads as highway engineer.

Arnold, Dr. Craig, has been appointed engineer for the State Highway Department of Georgia.

Wise, Russell, of Passaic, N. J., has been appointed city manager of Clifton, N. J.

Witter, George, of Ida Grove, Ia., has been appointed county engineer of Ida county, Ia.

Carlisle, John N., formerly state highway commissioner of New York, will take a new position as head of the Northern New York Utilities Co., of Watertown, N. Y.

Benson, S., has resigned as state highway commissioner of Oregon, and John B. Yeon appointed a member of the same commission to fill the vacancy left by Mr. Benson.

MacStay, Arnold B., has resigned as street cleaning commissioner of New York City and has accepted a position as deputy commissioner of public welfare.

Thourot, Harry, recently with the Hudson county engineer, has been appointed town engineer of Union Hill, N. J.

Sylvester, E. W., has resigned as superintendent of public works and city engineer of Poughkeepsie, N. Y., to enter the Pennsylvania State Highway Department.

Wyse, F. C., has resigned his position as city engineer of Columbia, S. C., to enter the engineering and contracting business.

Tomlinson, W. S., has been appointed city engineer of Columbia, S. C.

Harris, John K., has been appointed borough engineer of Sharon, Pa.

Davis, E. R., has been promoted to the position of chief engineer of Newport News, Va.

Tuttle, Arthur S., deputy chief engineer of the Board of Estimate and Apportionment, New York City, has been appointed chief engineer, to succeed Nelson P. Lewis, resigned.

Sission, Herbert S., state commissioner of excise since 1917, has been appointed New York State Highway Commissioner, to succeed Col. Frederick S. Greene, who resigned.